



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,798	01/21/2004	Cherie R. Kagan	YOR920000186US2	9993

7590 04/03/2006

PAUL D. GREELEY, ESQ.
OHLANDT, GREELEY, RUGGIERO & PERLE, L.L.P.
10th FLOOR
ONE LANDMARK SQUARE
STAMFORD, CT 06901-2682

EXAMINER

CHAN, SING P

ART UNIT PAPER NUMBER

1734

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/761,798

Applicant(s)

KAGAN ET AL.

Examiner

Sing P. Chan

Art Unit

1734

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 14-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 22, 23 and 25-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

1. Applicants' affirmation of the election of Species A (Self-assembled monolayer is prepared by a stamp) is acknowledged. The examiner agrees with applicant's argument of claims 22-29 directed to the thin film in claim 1 being deposited by a solution-based deposition process and depend indirectly or directly to claim 1 and therefore, should be examined. Claims 22-29 are rejoined to the elected species A and examined on the merits.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 22-24, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by DeGuire et al (U.S. 5,545,432).

Regarding claims 1-4, DeGuire et al discloses a method of forming metal oxide thin films. The method includes providing a substrate such as Si wafer, glass, solid particles, metal (Col 3, lines 65-67), aluminum, titanium, nickel, alloy with native or thermally-produced oxide coating (Col 4, lines 58-61), or polymeric such as polystyrene, polyethylene or polyimide (Col 6, lines 31-35) and in any solid or particulate form such as flat, corrugated, involute, invaginated, porous, spherical or amorphous (Col 5, lines

Art Unit: 1734

1-4), depositing an organic layer of self-assembled monolayer (SAM) (Col 3, lines 65-67), depositing metal oxide thin film onto the SAM to a thickness of 20 Å or thicker films, which are granular with uniform particle size of 50 nm (Col 4, lines 12-24), which are not a monolayer.

Regarding claims 22-24, DeGuire et al discloses the layer of metal oxide film such as TiO_2 , which is a nanoparticle of metal oxide is deposited by aqueous solution onto the SAM. (Col 4, lines 12-24) Furthermore, the recitation of organic-inorganic hybrid such as $(\text{C}_6\text{H}_5\text{C}_2\text{H}_4\text{NH}_3)_2\text{SnI}_4$, $(\text{C}_4\text{H}_9\text{NH}_3)_2\text{CH}_3\text{NH}_3\text{Sn}_2\text{I}_7$, $(\text{C}_6\text{H}_5\text{C}_2\text{H}_4\text{NH}_3)_2\text{CH}_3\text{NH}_3\text{SnI}_4$, $(\text{H}_3\text{NC}_4\text{H}_8\text{NH}_3)_2\text{SnI}_4$, and a mixture thereof in the claim 24 is satisfied by DeGuire et al since claim 23 required the thin film be one of the selected group of materials, which is recited by DeGuire et al.

Regarding claim 29, DeGuire et al discloses the substrate is immersed in the solution to deposit the metal oxide. (Col 8, lines 15-19)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeGuire et al (U.S. 5,545,432) as applied in claim 1 above, and further in view of Kumar et al (U.S. 5,512,131).

Regarding claims 5-8, DeGuire et al as disclosed above is silent as to the SAM is deposited by a stamp. However, using a stamp to deposit SAM is well known and conventional as shown for example by Kumar et al. Kumar et al discloses a method for forming microstamped patterns on surfaces. The method includes providing a stamp form of elastomeric polymeric material such as silicone polymers, epoxy and acrylate polymers (Col 8, lines 30-45) with indentations defining an indentation pattern, coating the stamp with molecular species, positioning the stamp into position and bring the stamp into contact with the surface of the substrate and held against the surface to hold the species against the surface, removing the stamp to provide SAM on the surface (Col 5, line 62 to Col 6, line 14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a stamp to deposit SAM onto the surface of the substrate as disclosed by Kumar et al in the method of DeGuire et al to provide a method to conveniently and reproducibly producing a variety of SAM patterns on planar and nonplanar surfaces. (See Kumar et al, Col 2, lines 25-34)

Regarding claims 9-11, DeGuire et al discloses the molecular species for the SAM includes end groups of surfactant with aromatic thiols, alkyl thiols, isocyanide, and trichlorosilane at the ends of the long hydrocarbon chain of SAM. (Col 5, lines 22-42)

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeGuire et al (U.S. 5,545,432) in view of Kumar et al (U.S. 5,512,131) as applied to claim 5 above, and further in view of Chrisey et al (U.S. 5,688,642).

DeGuire et al as modified by Kumar et al discloses the molecular species for the SAM includes "fluorinated hydrocarbon" (See Kumar et al, Col 11, lines 56-63) and used to facilitate the attachment of biomolecules on the submicron scale (See Kumar et al, Col 2, lines 29-32). But, is silent as to the 'fluorinated hydrocarbon' includes (tridecafluoro-1,1,2,2-tetrahydrooctyl) trichlorosilane. However, using (tridecafluoro-1,1,2,2-tetrahydrooctyl) trichlorosilane for SAM is well known and conventional as shown for example by Chrisey et al. Chrisey et al discloses a method of selective attachment of nucleic acid molecules to patterned self-assembled surfaces. The method includes forming a thin film of organosilane (SAM) using (tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane to form the SAM on a silica slide. (Col 10, lines 29-35)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide (tridecafluoro-1,1,2,2-tetrahydrooctyl) trichlorosilane as a molecular species for forming SAM on a substrate as disclosed by Chrisey et al in the method of DeGuire et al as modified by Kumar et al to provide a method of preparing surfaces, which nucleic acid molecules (NAMs) may be immobilized to form arrays or patterns of NAMs. (See Chrisey et al, Col 3, lines 26-31)

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeGuire et al (U.S. 5,545,432) in view of Kumar et al (U.S. 5,512,131) as applied to claim 5 above, and further in view of Wefers et al (U.S. 5,059,258).

DeGuire et al as modified by Kumar et al discloses molecular species for the SAM includes hydrocarbon, fluorinated hydrocarbon, halogenated, and phosphate species. (See Kumar et al, Col 11, lines 42-63) But, is silent as to the species is

Art Unit: 1734

octadecylphosphonic acid. However, providing octadecylphosphonic acid as a species for forming SAM is well known and conventional as shown for example by Wefers et al. Wefers et al discloses a method of bonding phosphonic acid to aluminum hydroxide layer. The method includes providing a molecular species such as long and short chain hydrocarbon, carboxylic acids, amine, alcohols, organosilicones, polymeric phosphonic acids such as octadecylphosphonic acid, which will form a SAM. (Figure 1 and Col 4, lines 24-66)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide octadecylphosphonic acid as the molecular species for forming SAM on the substrate as disclosed by Wefers et al in the method of DeGuire et al as modified by Kumar et al to provide any molecular species; which are all equivalents to form the SAM on the substrate.

7. Claims 25, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeGuire et al (U.S. 5,545,432) as applied to claim 23 above, and further in view of Hawker et al (U.S. 6,423,465).

DeGuire et al as disclosed above is silent as to thin film is a photoresist. However, providing a photoresist on a monolayer is well known and conventional as shown for example by Hawker et al. Hawker et al discloses a method of forming patterned polymeric brush on a substrate surface. The method include forming the polymeric brush on the substrate the same way as self assembled monolayer, which is a monolayer of polymeric material (Col 1, lines 50-62), applying a polymer composition such as methyl methacrylate-co-methacrylic acid by spin coating or dip coating,

Art Unit: 1734

applying a deep UV radiation to the decompose the photoacid generator and removing the remaining photoresist by washing with appropriate solvent. (Col 11, lines 18-67) Furthermore, photoresist coating is imagewise expose to the UV radiation (Col 11, lines 44-50) and inherently includes either a positive or a negative image of the desired pattern.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a photoresist on a monolayer of polymer brush and applying deep UV radiation to form either a positive or negative image pattern on the photoresist as disclosed by Hawker et al in the method of DeGuire et al to provide a processing technologies for semiconductor with extremely stable, high resolution, and versatile product. (See Hawker et al, Col 2, lines 37-40)

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeGuire et al (U.S. 5,545,432) as applied to claim 23 above, and further in view of Schildkraut et al (U.S. 5,115,336).

DeGuire et al as disclosed above is silent as to thin film is metallo-organic complex of tin 2-ethylhexanoate. However, providing a coating on a SAM with metallo-organic complex is well known and conventional as shown for example by Schildkraut et al. Schildkraut et al discloses a method of forming a photorefractive system. The system includes an optically active layer formed by SAM (Col 12, lines 51-62) and forming a protective coating using metal fluoride coating by thermal decomposition of the metal carboxylate, i.e. metal acetate³ or 2-ethylhexanoate (Col 16, lines 5-9 and Col

16, lines 34-44), wherein the metal includes alkaline earth, rare earth, and alkali oxide and fluoride (Col 16, lines 9-26), which inherently includes tin as a rare earth metal.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a protective coating on the SAM using a metal 2-ethylhexanoate such as tin 2-ethylhexanoate as disclosed by Schildkraut et al in the method of DeGuire et al to provide a inert stable compounds as an protective layer for the SAM. (See Schildkraut et al, Col 16, lines 9-12)

Response to Arguments

9. Applicant's arguments filed January 19, 2006 have been fully considered but they are not persuasive.

10. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Instant case, the argument of Kumar does to teach a thin film that is not a monolayer, the examiner relied on Kumar in combination with DeGuire et al to provide the teaching of using a stamp to apply the SAM material. The teaching of the thin film is not a monolayer is provided by DeGuire et al, wherein the thin film was deposited with a thickness of 20 Å or thicker. (See DeGuire et al, Col 4, lines 13-24)

11. In response to applicant's argument of DeGuire et al's claim 1 includes other features that the claims of the instant application does not have, the examiner disagree, the claims of the instant application are an open claim language and therefore does

Art Unit: 1734

exclude any features that are not recited in the claim. Therefore, DeGuire et al does recite the instant invention.

In response to applicant's argument of Kumar discloses depositing a second SAM to the first SAM and this feature is not recited in the instant claim 1, the examiner disagree, again the claims of the instant application are open claim language and therefore does not exclude any features that are not recited in the claim. Also, the examiner relied on Kumar to provide the general teaching of using a stamp to applying material for SAM onto a substrate. Furthermore, the instant claims are interpreted in light of the Specification, however, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993) Therefore, any arguments pertaining to the recitation in the specification are not persuasive, since these limitations are not recited in the instant claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sing P. Chan whose telephone number is 571-272-1225. The examiner can normally be reached on Monday-Thursday 7:30AM-11:00AM and 12:00PM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher A. Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1734

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cham Sing Po

SPC

ca
CHRIS FIORILLA
SUPERVISORY PATENT EXAMINER
AU 1734